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ABSTRACT

This paper summarizes initial data from a study that investigates issues in internationalization and globalization of mathematics education in two regions: Australasia and Latin America. The first stage of study employed the methodology of focus groups with mathematics educators from Australia, New Zealand, Mexico and Colombia. The paper present an initial theoretical model to investigate internationalization and globalization in the field, presents the methodology employed and discusses the alternative conceptualizations exhibited by the participants, some of the reasons they identified for them and some of the problems they identified. (Author)

Mathematics Educators' Views about Globalization and Internationalization of Their Discipline: Preliminary Findings

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Mathematics educators' views about globalization and internationalization of their discipline: Preliminary findings[1]

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This paper summarizes initial data from a study that investigates issues in internationalization and globalization of mathematics education in two regions: Australasia and Latin America. The first stage of study employed the methodology of focus groups with mathematics educators from Australia, New Zealand, Mexico and Colombia. The paper presents an initial theoretical model to investigate internationalization and globalization in the field, presents the methodology employed and discusses the alternative conceptualizations exhibited by the participants, some of the reasons they identified for them and some of the problems they identified.

The mathematics education community has shown considerable awareness of the international status of their discipline. Robitaille and Travers (1992) argue that mathematics education is perhaps the most international subject of higher education. This *internationalization* of the discipline is reflected by the number of international students studying the discipline overseas; patterns of colonialization in the last hundred years; the emergence of international organizations such as UNESCO, World Bank, and ICMI; and the proliferation of regional and international research projects, conferences and publications. Arguably, the term *globalization* is not as widely known in the mathematics education literature. A search of the literature yielded only two chapters published on this topic in Atweh, Forgasz and Nebres (2001).

This paper summarizes initial data from a study that investigates issues in internationalization and globalization of mathematics education in two regions: Australasia and Latin America. The first stage of study employed the methodology of focus groups with mathematics educators from Australia, New Zealand, Mexico and Colombia. The paper presents an initial theoretical model to investigate internationalization and globalization, presents the methodology employed and discusses the alternative conceptualizations exhibited by the participants, some of the reasons they identified for them and some of the problems they identified.

Conceptualization of the terms

Atweh and Clarkson (2001) note that the two terms *globalization* and *internationalization* are at times used by different authors to mean the same thing and also different authors have used the same term to mean different

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P. Valero & O. Skovsmose (2002) (Eds.). Proceedings of the 3rd International MES Conference. Copenhagen: Centre for Research in Learning Mathematics, pp. 1-10.

things. Hence, it is appropriate to commence by attempting to define the two terms as they will be used in this paper.

Taylor, Rizvi, Lingard and Henry (1997), understood internationalization as "relationships and transactions between nations rather than those which transcend national boundaries" (p. 57). Accordingly, any activity that involves a cross-country collaboration contributes to the internationalization of the activities of the partners. The examples given above are examples of internationalization of the discipline.

Robertson (1992, cited in Henry & Taylor, 1997) defined *globalization* as a concept which refers "both to the compression of the world and the intensification of consciousness of the world as a whole" (p. 46). Waters (1995) used the term globalization as "a social process in which the constraints of geography on social and cultural arrangements recede and in which people become increasingly aware that they are receding" (p. 3). Some examples of processes that may reflect globalization trends in mathematics education are: the convergence of school mathematics and mathematics education around the world; similarity in research questions and methodologies and the standards of reporting research; and wide spread acceptance of epistemological positions such as constructivism.

Perhaps it is useful at the outset to deal with few misconceptions about globalization. Globalization is not the same as *homogenization* (Henry & Taylor, 1997). For these authors, globalization consists of "contradictory impulses of integration, fragmentation and differentiation" (p.47). For example, even though issues such as feminism, indigenous land rights, gay rights, and human rights have gained global status, issues related to local context cannot be overlooked. For instance, the globalization of concerns about the status of women has raised issues about voices and the right of middle class, heterosexual Anglo-Saxon women to speak on behalf of black women, lesbians or women from developing countries.

Similarly, the utopian view of globalization is not tenable. For some enthusiasts, globalization is the direct result of modernization based on principles of liberal democracy. For some, the end of globalization "the world should become a unified ... field of isomorphic democratic institutions that would mediate lasting peace among states as well as social groups, and of self leveling markets that would ensure steady economic growth" (Derluguian & Greer, 2000, p.3). Arguably this view is not supported by evidence. The rampaging international competition of the last century has caused unprecedented degradation of the environment and an ever widening gap between the rich and poor countries and between the rich and the poor within most developed countries.

Methodology employed

This part of the two-year study consisted of the conduct of focus groups (Morgan, 1997; Vaughn, Schumm, & Sinagub, 1996)[2]. The focus groups were conducted in Australia, Mexico and Colombia[3]. Organizers of the focus groups were requested to invite leading mathematics educators in their countries with substantive international contacts. The focus groups lasted between one and two hours each and comprised between 5 and 10 educators. Prior to the focus group participants have received a one page summary of the terms used and some issues that they may want to address. Focus groups allow participants to raise issues that are important to them rather than address the questions posited by the researchers. From time to time, the researchers asked some clarifying questions and directed the discussion to move on to other topics. The focus groups and the discussion paper were presented in the language of the participants. The discussions were transcribed, translated into English and confirmed by a second research assistant. The transcripts will be sent back to the participants for checking and suggesting alterations and any additions that they like to make.

Alternative conceptualizations of the terms

Perhaps not surprisingly, there is a general lack of familiarity with the two terms "globalization" and "internationalization" - perhaps more so with globalization- exhibited by many of the mathematics educators in the three focus groups conducted. This lack of familiarity is consistent with their limited discussion in the mathematics education literature. However, this is not to say that mathematics educators are unaware of the international status of their discipline or that they are unaware of the arising issues. These focus groups revealed some discomfort and confusion by many participants in dealing with the short differentiation provided to them in the discussion paper prior to the conduct of the focus groups.

For one Colombian academic, the concept of internationalization refers to activities within the international mathematics education community, such as collaborative development and mutual projects among nations. Similarly, the sharing of advances in knowledge, such as sciences, is part of internationalization. However, globalization is a matter of government policy. According to her, globalization in education means policies towards high-level qualifications that enable graduates to function in a globalized world. She argues, because of the low standards in and social value of education, globalization is not happening in many Latin American countries. Only international agreement on global education can achieve this result (Colombian

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[2] Later stages of the project will involve surveys and case studies.

[3] A fourth interview was conducted in Brazil but was not available for analysis at the time of writing. Similar focus groups are planned for 2002 in selected Asian countries.

Focus Group, p. 4). For another educator, globalization of curriculum in mathematics education implies the inclusion of content, such as modeling, to allow students to understand and be able to function in a globalized economy and world affairs (Colombian Focus Group, P. 7).

A participant in the Australian focus group has suggested that the terms internationalization and globalization may be paralleled with two terms used at different stages in Aboriginal policy in Australia: namely assimilation and integration respectively. "Integration is people living side by side exchanging ideas ... both offering their strengths, both recognizing their limitations and nobody actually trying to take over [the culture of the other]. Whereas assimilation is assimilation into ... more dominant culture" (Australian Focus Group, p. 5). For some people, the two terms have been discussed as a "good hat/bad hat"[4] dichotomy.

A sociologist from Mexico participating in the focus group understands internationalization as an activity in which "there are only a few countries involved in reaching a goal, in conducting a study, or carrying out an activity" (Mexican Focus Group, p. 1). On the other hand globalization is "this thing that transforms me and hybrids me, that is to say that is changing me without my awareness" (Mexican Focus Group, p. 8). She adds that this phenomenon is different from colonialism "because it invites us to be hybrids rather than colonials". (Mexican Focus Group, p.8). This educator criticizes simplistic attempts to understand international activities without considering the overall context of globalization. Globalization is a phenomenon that is developing and "swallowing up internationalization " (Mexican Focus Group, p.3).

Another Colombian educator contrasts the concepts of globalization with colonialism. While she accepts that concepts adopted critically from overseas are a form of globalization, uncritical copying of ideas is a form of colonialism. She cites the focus on problem solving in the primary school as an example of globalization, while the adoption of textbooks on calculus at university level from the United States is a form of colonialism. The difference is that in the former, but not latter case there is a government policy in that regard based on local expertise to understand the focus and implementing it as a matter of choice.

For two New Zealand participants, with wide international exposure, in the Australian Focus Group, the terms internationalization and globalization are mere "Americanisms" (Australian Focus Group, p. 1) and " American[5]

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[4] The exact terms used in the interview were white hat/black hat changed here for appropriateness.

[5] Of interest here is the wide use of the term American to denote the United States of America, a practice often found to be of concern to people from South America in particular. In this paper we will continue to use the term only in direct quotes when used by different participants.

colonialism, if we are not careful" (Australian Focus Group, p. 3). Perhaps for these two educators, the terms are synonymous and imply universalism and uniformity. The former participant has spoken of his recent travels in Europe where he was impressed by the differences more than the similarities between mathematics education in the different countries. He summarizes his views as "the more I get into mathematics education, the more I am aware of differences rather than the more I am aware of similarities" (Australian Focus Group p. 2). The latter participant contrasts globalization with its "flip side, ... the celebration of diversity" (Australian Focus Group, p. 3).

This latter educator asserts the value in exchange of ideas and experiences between educators from around the world. However, this exchange is limited because "cultures are different ... you can not just pick up something from Germany [let's say] and apply it to New Zealand, and even more so from Asia to New Zealand, where the cultural differences are considerable" (Australian Focus Group, p. 4). He adds, "now that is not to say the we shouldn't be inter-changing ideas and getting stimulus from one another, but that is very different from your [*that is, what he conceived is the authors'*] meaning of globalization and how I and many others in the past have interpreted it" (Australian Focus Group, p. 4). He points out that many international gatherings in the past have been dominated by UK and USA reforms such as the Cockroft report and the Standards documents and how many keynote speakers from the United States tend only to refer to literature from their own country. These are indicators of colonialism rather than globalization.

The "Americanization" of many international contacts worries another Australian educator who proposes that recent international conferences have arisen "as a reaction from the Europeans who said: hey wait a minute, we're getting too American or we're getting too watered down and we've got a rich culture that we want to maintain and therefore we'll try to run our own conferences" (Australian Focus Group, p. 6).

Factors enhancing internationalization and globalization

In the focus groups, many of the participants have identified reasons why internationalization and globalization processes in mathematics education have been escalating. As expected, these views are quite varied and, at times, conflicting. However, there were more differences between the participants' views within countries than there were between countries.

First, for some mathematics educators, mathematics curricula in many school systems around the world are similar because of the *nature of mathematics* itself. Mathematics is often seen as objective and true irrespective of culture and human agency. A Colombian educator puts it this way: "definitely it is impossible to have a different program in arithmetic for the first years of school. The differences [between curricula around the world] may be the

methodological approaches or [sequencing of topics]. I think this [is true] because of the character of mathematics" (Colombian Focus Group, p. 9).

Others contest this explanation for the globalization of the curricula. A mathematics educator from Colombia argues that often there are social reasons why a certain topic in introduced in school or university mathematics. He gave the example that calculus was introduced in the US schools as a response to their needs (for example in space race and technological advances) while other topics (such as absolute value) were introduced into the education system to differentiate between students for university entrance purposes. Even though these topics exist in the Colombian education system they are there for different reasons as those in the USA. Hence, it is not the nature of mathematics itself that always determine similarities in curricula around the world.

Second, for some mathematics educators, the patterns of *colonialization* and *education aid* of countries around the world during the past hundred years are a crucial factor in the development of similar mathematics curricula around the world. For example, a mathematics educator from Mexico stresses that internationalization is not a recent phenomenon. Since the beginning of the century Mexico has been open to many influences from different countries. The processes of internationalization commenced prior to the evolving of the recent technologies of communications. These interactions evolved through action of individuals. For example, "in the 1970s we had the new mathematics because a [certain] number of people implanted a reform that they have studied in other [countries]" (Mexican Focus Group, p. 6). Even though with the advancement of technology and quick access to information in journals and conferences, the human role in transmitting of trends remains paramount.

Third, there may be other less rational reasons for the adoption of international trends in mathematics education. According to one educator from Colombia there are occasional *"fashions"* that become entrenched in mathematics education and are uncritically accepted in many countries. He cites examples such as individualized teaching, use of technology such as the Internet and television, competency-based education, and multiple intelligence. The adoption of these "fashions" is not based on a process of critical evidence and consensus that they are needed or useful in the Colombian context (Colombian Focus Group, p.9). Arguably, such uncritical adoption is due to limited resources available to evaluate their effectiveness and whether they are in harmony with the national identity of the country (Colombian Focus Group, p, 14).

Fourth, perhaps more important than " fashions" in the uncritical adoption of foreign curricula and programs in mathematics education are some *assumptions* that are often made in relation to mathematics *education and the economy*. Commenting on the needs of Laos, one Australian mathematics educator asserts that developing nations need assistance from more developed countries because "they want to be part of the world economy ... part of the

international scene" (Australian Focus Group, p. 14 and 15). After a considerable time of isolation of the country due to internal politics, they are slowly opening to international trends and markets. Another Australian educator points out that

> the critical part is that there is an ideology out there, that if you take a western view, whatever that may be, and I think that even within the Western view, it's a narrow American view, that if they take that view of the world then that's what is going to give them access to power ... That is the way they're going to get out of their, in a sense, oppressed state, by [adopting] the American curriculum ... (Australian Focus Group, p.20&21)

Fifth, These *economic considerations* act differently in developing countries and in developed countries. The Australian focus group has discussed the increased reliance of many Australian universities on funds obtained from overseas students. Mathematics educators in both Australia and New Zealand have shown considerable concern about problems that such emphasis on marketization of higher education can cause. One educator who has worked with Canadian teacher training students visiting Australia to get their qualifications there, points out the conflict between the requirements for local registration of teaches in Australia and the needs expressed by the students themselves who aspire to teach in their home country (Australian Focus Group, P. 23).

Sixth, in contrast with the official and university policies that promote marketization of educational delivery, mathematics educators often express more sincere *humane and ethical reasons* for being involved in international projects of development and research. An Australian educator who is the editor of an international journal in mathematics education as well as an international handbook on mathematics education discusses her efforts to solicit articles and chapters from a wide range of developing countries. Documents from non-English speaking countries often need more assistance and editing to reach the "standards" adopted by the publications. She adds

> one of my greatest rewards I get from the Journal is working with people who present papers of potential, and working with them over a period of time to get their papers published, and they are eternally grateful for this and they come from many many countries. To me, that is [very] rewarding. (Australian Focus Group, p. 11).

Another edúcator with extensive work in Papua New Guinea and Laos commented that many mathematics educators are less colonial in dealing with colleagues from developing countries than in the past (Australian Focus Group, p. 17). She discusses the need to be not only more sensitive to the local culture but to really know it and understand it. This she has achieved by living in the country with the people she is working with, learning their language and history and designing programs that are based on what they already have and designed to suit their expressed needs (Australian Focus Group pp.14-16).

Finally, the *advancement in technology* and greater ease in world travel have led to increased international activity and globalization of ideas. While international contacts have dated for centuries in the different participating countries, most educators were aware that the more recent activities are quantitatively and qualitatively different to past activities. Even in countries of very limited resources such as Colombia, mathematics educators indicated their reliance on the Internet to keep in touch with some international publications and the few conferences that they are able to attend.

It is worthwhile to mention that the Colombian educators were somewhat divided on the amount and value of contact with international trends and ideas. For some, the country has fallen behind in recent trends because of limited resources available to them. One educator expressed a certain anxiety that "we feel we are in a diminished situation, so minimal, that we are only a small piece in the big board" (Colombian Focus Group, p. 7). However, another educator asserted that a few recent research studies have appropriated of internationally-developed theoretical stances and developed them into local research agendas (Colombian Focus Group, p. 16). She added, there is nothing wrong about this use of international theories, after all "we cannot be here just isolated and to close the door to the world outside" (Colombian Focus Group, P. 16). Another researcher noted the advances in the use of research methodologies in the country. She asserts, "We need to look at what is outside to understand what we have [done here]. In spite of these advances they are not always recognized as local products and people prefer the international products. This thinking also needs to be altered. Thanks to the process of internationalization, and the availability of the Internet and international journals this is happening (Colombian Focus Group, p.16).

Reciprocity in internationalization and globalization

The participants in the different focus groups were able to identify several benefits as well as problems in internationalization and globalization in mathematics education. Due to space limitation only the issue of reciprocity of the contributions of the different countries will be discussed here.

According to one Mexican educator, reciprocity of the effects that different countries have on each other is an integral criterion for an activity to be called globalization. He provides the example of currency devaluation in one country affecting the economy on other countries - arguably not to the same extent. In education, he argues, this is not the case. "If [the effect] is unidirectional it isn't globalization; it would be colonization or imperialism" (Mexican Focus Group, p. 10).

This is supported by other educators in both interviews in Latin America. Another educator from Mexico argues that certain forms of knowledge are more valued than others. She discusses how the level of recognition that academics receive from their institutions is subject to them presenting them in international

conferences or journals in contrast to local or regional conferences. She goes on to raise the questions if and how this hegemony can be broken (Mexican Focus Group, p. 10). To her "confusing international as synonymous with quality and pertinence is one of the bad attributes of globalization" (Mexican Focus Group p. 11).

Australian educators see themselves in a somewhat privileged position because they have access to literature from both Europe and the US. One educator commented on the often expressed feeling in the US that there is not enough research and theorizing of equity in mathematics education. US researchers often omit what is done in other countries in these areas. She advises, "Look at what is happening in the UK, look at what is happening in Australia. Look at what is happening in South America. But the Americans don't read that literature" (Australian Focus Group, p. 24)

A New Zealand educator relates a story that happened in an international conference in Japan. He notes that the Japanese educators seemed to be widely read about the literature in mathematics education published in English which they have translated into Japanese. When an English-speaking educator asked a Japanese colleague why don't they translate their research into English, the reply was "you can translate them [yourself] if you want to" (Australian Focus Group, p. 18).

Final comments

In the three focus groups there was a general acceptance of the mathematics education communities in the two regions about the possible benefits of international activities in their discipline. Similarly, there is a sober awareness of some limitations of such activities and problems arising. These will be dealt with in future publications from the projects. From the analysis above, it is obvious that the traditional theoretical constructs common in mathematics education may not be sufficient to investigate the role of the discipline in a globalized world. New construct from sociology may supplement the debate about the effect of the new times on the discipline.

A common concern expressed in all three interviews is the (thin?) line between globalization and colonialism. Participating mathematics educators are concerned about that lack of reciprocity displayed in many of the international contacts in their discipline. Undoubtedly, the reasons, manifestations and implications of this lack of reciprocity are complex and require further research and debate. Questions of efficiency and effectiveness should not overshadow ethical and equity questions. More than ever mathematics educators should examine their the theory and practice of their discipline in terms of voice and power – both at the local and global levels.

Another common concern expressed in the interviews was the dialectical relationship between the global and the local. We suggest that the traditional oppositional logic that constructs the two spheres as contradictory may not be

useful to understand the complexity of our late modernity times. Further research and debate is needed to study the interaction between the local and global. In particular areas such as ethnomathematics and critical mathematics need to take the globalization factor into their theorizing and practice.

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